

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

FOR NPS USE ONLY

RECEIVED

DATE ENTERED

**NATIONAL REGISTER OF HISTORIC PLACES
INVENTORY -- NOMINATION FORM**

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
First Self-Sustaining Nuclear Reaction Site

AND/OR COMMON
The Enrico Fermi Memorial

2 LOCATION

STREET & NUMBER
East side of South Ellis Avenue, between East 56th Street

CITY, TOWN

NOT FOR PUBLICATION

CONGRESSIONAL DISTRICT

STATE

ILLINOIS

VICINITY OF

CODE
17

COUNTY
Cook

CODE
031

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
<input type="checkbox"/> DISTRICT	<input checked="" type="checkbox"/> PUBLIC	<input checked="" type="checkbox"/> OCCUPIED	<input type="checkbox"/> AGRICULTURE	<input type="checkbox"/> MUSEUM
<input type="checkbox"/> BUILDING(S)	<input type="checkbox"/> PRIVATE	<input type="checkbox"/> UNOCCUPIED	<input type="checkbox"/> COMMERCIAL	<input checked="" type="checkbox"/> PARK
<input type="checkbox"/> STRUCTURE	<input type="checkbox"/> BOTH	<input type="checkbox"/> WORK IN PROGRESS	<input type="checkbox"/> EDUCATIONAL	<input type="checkbox"/> PRIVATE RESIDENCE
<input checked="" type="checkbox"/> SITE	PUBLIC ACQUISITION	ACCESSIBLE	<input type="checkbox"/> ENTERTAINMENT	<input type="checkbox"/> RELIGIOUS
<input type="checkbox"/> OBJECT	<input type="checkbox"/> IN PROCESS	<input checked="" type="checkbox"/> YES: RESTRICTED	<input type="checkbox"/> GOVERNMENT	<input type="checkbox"/> SCIENTIFIC
	<input type="checkbox"/> BEING CONSIDERED	<input type="checkbox"/> YES: UNRESTRICTED	<input type="checkbox"/> INDUSTRIAL	<input type="checkbox"/> TRANSPORTATION
		<input type="checkbox"/> NO	<input type="checkbox"/> MILITARY	<input type="checkbox"/> OTHER:

4 OWNER OF PROPERTY

NAME
The University of Chicago (Office of Special Events, Administration Building)

STREET & NUMBER
5801 Ellis Avenue

CITY, TOWN
Chicago

VICINITY OF

STATE
Illinois

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC. Cook County Recorder and Registrar of Titles

STREET & NUMBER
118 North Clark

CITY, TOWN
Chicago

STATE
Illinois

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
none known

DATE

FEDERAL STATE COUNTY LOCAL

DEPOSITORY FOR
SURVEY RECORDS

CITY, TOWN

STATE

7 DESCRIPTION

CONDITION

EXCELLENT
 GOOD
 FAIR

DETERIORATED
 RUINS
 UNEXPOSED

CHECK ONE

UNALTERED
 ALTERED

CHECK ONE

ORIGINAL SITE
 MOVED DATE _____

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The first self-sustaining nuclear reactor was housed in a converted squash-rackets court, a 30 by 60 foot room with a balcony on the north end, raised about ten feet from the floor, from which the scientist directed and observed experiments on the "Chicago Pile." The court was located under the West Stands at Chicago University's old Stagg Field. The West Stands was a vine-covered fortress-style structure with round crenellated towers on both ends, a square central pavilion, lancet windows on the second story, and battlements along the top of the wall. The West Stands structure occupied nearly the entire length of the block of Ellis Avenue between East 56th and 57th Streets.

The West Stands were torn down in 1958 because of radiation in the building and the structure's generally unsound condition. At the time of the national historic landmark designation, a grassy plot between two tennis courts was identified as the site of the demolished squash-rackets court.

The new limestone Joseph Regenstein Library now occupies most of the block where the old Stagg Field stood. To commemorate the twenty-fifth anniversary of the first controlled generation of nuclear power in the experiment by Enrico Fermi and his colleagues, the B. F. Ferguson Monument Fund commissioned Henry Moore to build an appropriate sculpture to be the focal point of the Enrico Fermi Memorial on the original experiment site. December 2, 1967 they presented to the citizens of Chicago the twelve foot high, three ton Moore sculpture which is mounted on a base of black polished granite on a wide stone platform three steps above grade. A few feet from the sculpture is a slab of granite on which four plaques are mounted--one of them identifying the site as a national historic landmark.

Of his bronze "Nuclear Energy" Moore said: I prefer to let my work speak for itself, but sometimes it is possible to give a hint or a clue of what was in one's mind in making the sculpture. In this, the upper part is very much connected with the mushroom cloud of an atomic explosion, but also, it has the shape and eye sockets of a skull. The lower half of the sculpture is architectural and in the arched cavities and domed interiors, I had reminiscences, in my mind, of the inside of a church or cathedral. The whole sculpture was meant to have a contained power and force.

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CONTINUATION SHEET Significance ITEM NUMBER 8 PAGE 2

A fascinating aspect of the entire undertaking is that a gigantic program had been set in motion before a chain reaction had occurred. The scientists had to rely solely on their calculations in all their work. Dr. Zinn in Chicago, for example, had to design the dies for the uranium oxide before they could be tested, and the entire construction of the pile depended upon the shape and size of the uranium pieces. Those pieces, fortunately, met the requirements for the pile.

The construction of the main pile began in November, 1942. As graphite bricks were machined in the West Stands, Fermi directed the building of the pile in the squash-rackets court in the same structure. The pile consisted of alternate layers of graphite bricks and pressed uranium oxide, and it grew daily, with all of the scientists involved realizing that the climax was approaching for their work. A little after 4:00 p.m. on December 1, the last layers of graphite and uranium oxide were put into place. All told, six tons of uranium oxide lay in the pile.

To avoid the possibility of a runaway chain reaction, the builders of the pile had inserted three cadmium rods into it. Cadmium gobbles up neutrons, and if mischance required it, two of the three rods could be pushed into the pile in order to absorb the neutrons and halt the reaction. The cadmium rod closest to the bottom of the pile had been calibrated so that it could be gradually pulled out from the pile as the experiment progressed, releasing more and more neutrons as it was withdrawn from the pile.

At 8:30 a.m. on December 2, an expectant group began to assemble in the squash-rackets court. Standing on a balcony at the north end of the court, Fermi at 9:45, had an electrically controlled set of rods removed. Then, just after 10:00, he directed that "Zip," a manually operated safety rod, be withdrawn. Counters on the balcony for counting neutrons had already begun to operate when, at 10:37, Fermi began the withdrawal of the vernier control rod. In successive steps, it was pulled to thirteen feet, and the counters clicked with increasing rapidity. Fermi then had it pulled some additional lengths. Fully confident of success, he then ordered the reaction stopped in order to check everything. And then, just after the experiment had been renewed, the automatic safety rod was activated and halted the reaction. A quick check showed that its safety point had been set too low. Yet, the accident gave Fermi a good chance to halt the experiment in order to eat, which he and his colleagues did.

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CONTINUATION SHEET Significance ITEM NUMBER 8 PAGE 3

The group had reassembled by 2:00 p.m. Once again, the vernier control rod was withdrawn at Fermi's direction; and just after having had it withdrawn another six inches at 3:25, Fermi said

This is going to do it. Now it will become self-sustaining.

It did and for the next twenty-eight minutes, the group watched the pile, until the reaction was halted at 3:53 p.m. Someone had brought along a bottle of Chianti wine, and the scientists ended their moment in history by drinking to success out of paper cups.

Subsequently, the official government report on the development of the atomic bomb stated in section 6, paragraph 29,

The pile was first operated as a self-sustaining system on December 2, 1942. So far as we know, this was the first time that human beings ever initiated a self-sustaining nuclear chain reaction.

History from the original report by S. Sydney Bradford, 1964.

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CONTINUATION SHEET Bibliography

ITEM NUMBER

9

PAGE

2

Press release on "Nuclear Energy" from University of Chicago, Office of Special Events, 1975.

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CONTINUATION SHEET Boundary ITEM NUMBER 10 PAGE 2

the curb of Ellis Avenue, to the south curb of East 56th Street, then westerly along this curb for about 90 feet, to the beginning point.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
<input type="checkbox"/> PREHISTORIC	<input type="checkbox"/> ARCHEOLOGY-PREHISTORIC	<input type="checkbox"/> COMMUNITY PLANNING	<input type="checkbox"/> LANDSCAPE ARCHITECTURE	<input type="checkbox"/> RELIGION
<input type="checkbox"/> 1400-1499	<input type="checkbox"/> ARCHEOLOGY-HISTORIC	<input type="checkbox"/> CONSERVATION	<input type="checkbox"/> LAW	<input checked="" type="checkbox"/> SCIENCE
<input type="checkbox"/> 1500-1599	<input type="checkbox"/> AGRICULTURE	<input type="checkbox"/> ECONOMICS	<input type="checkbox"/> LITERATURE	<input type="checkbox"/> SCULPTURE
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> ARCHITECTURE	<input type="checkbox"/> EDUCATION	<input type="checkbox"/> MILITARY	<input type="checkbox"/> SOCIAL/HUMANITARIAN
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> ART	<input type="checkbox"/> ENGINEERING	<input type="checkbox"/> MUSIC	<input type="checkbox"/> THEATER
<input type="checkbox"/> 1800-1899	<input type="checkbox"/> COMMERCE	<input type="checkbox"/> EXPLORATION/SETTLEMENT	<input type="checkbox"/> PHILOSOPHY	<input type="checkbox"/> TRANSPORTATION
<input checked="" type="checkbox"/> 1900-	<input type="checkbox"/> COMMUNICATIONS	<input type="checkbox"/> INDUSTRY	<input type="checkbox"/> POLITICS/GOVERNMENT	<input type="checkbox"/> OTHER (SPECIFY)
		<input type="checkbox"/> INVENTION		

SPECIFIC DATES December 2, 1942

~~UNIVERSITY OF CHICAGO~~ Henry Moore
Sculptor

STATEMENT OF SIGNIFICANCE

Scientists at the University of Chicago achieved the controlled release of nuclear energy for the first time on December 2, 1942. Guided in their efforts by knowledge gained from experiments in nuclear physics throughout the world prior to 1939 and spurred on by Germany's efforts to release the atom, the small group of scientists who first initiated a self-sustaining chain reaction that day in the West Stands at the University of Chicago placed in man's hands the ultimate means of determining his own destiny.

When America undertook the effort to obtain a self-sustaining chain reaction, her overall purpose was to produce an atomic bomb to help secure her own future. By the spring of 1940, scientists at several locations in the country were working on atomic matters. At Columbia University in New York, Dr. Enrico Fermi, a native of Italy, and Dr. Walter H. Zinn, Canadian born, endeavored to design a uranium chain reactor. Among others helping them in the project was Dr. Leo Szilard, a Hungarian.

A major problem in designing the reactor concerned the speed of the neutrons in a chain reaction. Fermi and his associates knew that the bombardment of a uranium atom by neutrons fissioned, or split, the atom, causing the emission of additional neutrons. They also realized that those neutrons fissioned other uranium atoms, which made possible a chain reaction in a sufficiently large mass of uranium. But the neutrons had to be slowed down for a self-sustaining reaction to occur. Fermi finally decided that a good moderator would be pure carbon graphite because it would cause the neutrons to lose energy as they passed through it and be more likely of fissioning the next uranium atoms they hit after leaving the carbon. Proceeding on that theory, the Columbia group experimented with a "lattice pile," which measured three feet by three feet by eight feet. This was a pile of graphite bricks, in which, at regular spaces, uranium was placed. Success in using it proved vital for the maturing atomic project.

Early in 1942, the Columbia group moved to the University of Chicago, where it established a so-called "Metallurgical Laboratory" in the West Stands at Stagg Field. While concurrent work progressed elsewhere, Fermi and his colleagues furthered their work concerning the development of the pile. Lack of uranium-oxide and pure graphite prohibited the construction of a large lattice-pile, but while strenuous efforts were made to produce those materials, about thirty experiments with small piles were made in Chicago. By July, 1942, those experiments had indicated a design for a pile of critical size, i. e. one in which a self-sustaining chain reaction could be obtained.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

Corbin Allardice and Edward R. Trapnell, The First Pile, reprint of AEC report TID-292, March 1955 (Argonne, Ill., 1961).
 Selig Hecht, Explaining the Atom (New York, 1947).
 Ralph E. Lapp, Roads to Discovery (New York, 1960).
 Henry DeWolf Smyth, Atomic Energy for Military Purposes (Princeton, N.J., 1945).
 Larry Wolters, "Birth, Life and Death--Shaped in Bronze," from Chicago Tribune Sunday Magazine, November 28, 1965.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY less than one acre

UTM REFERENCES

A	1 6	4 5 0 0 6 0	4 6 2 6 6 9 0	B			
	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
C				D			

VERBAL BOUNDARY DESCRIPTION

As seen on the enclosed xeroxed section of the University of Chicago Campus Map, the boundary of the landmark site is the area once covered by the West Stands of the now-destroyed Stagg Field, and presently the site of the Enrico Fermi Memorial, plus a stretch of lawn on both sides. The boundary runs southerly along the east curb of Ellis Avenue from East 56th to East 57th Streets; then easterly for about 90 feet along the north curb of East 57th Street; then due north, paralleling

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Blanche Higgins Schroer, Landmark Review Project; S. Sydney Bradford, 1964

ORGANIZATION

Historic Sites Survey, National Park Service

DATE

202/523-5464

STREET & NUMBER

1100 L Street NW., Room 5213

TELEPHONE

CITY OR TOWN

Washington

STATE

D.C.

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL

STATE

LOCAL

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE

DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

9/8/83

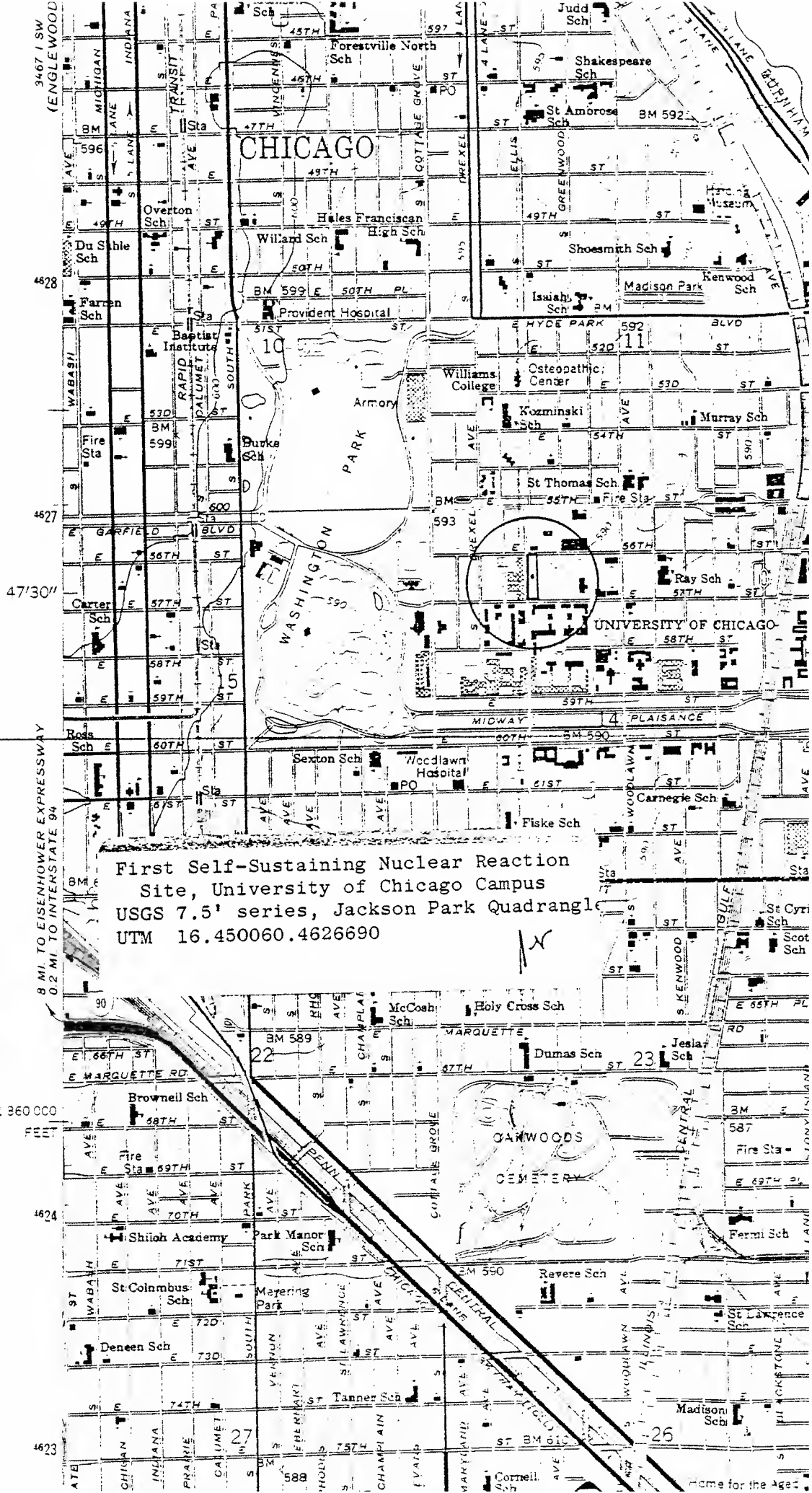
ATTEST:

DATE

KEEPER OF THE NATIONAL REGISTER

(NATIONAL HISTORIC LANDMARKS)

(NATIONAL HISTORIC LANDMARKS)



First Self-Sustaining Nuclear Reaction
 Site, University of Chicago Campus
 USGS 7.5' series, Jackson Park Quadrangle
 UTM 16.450060.4626690

3467' SW (ENGLEWOOD)
 4628
 4627
 47'30"
 8 MI. TO EISENHOWER EXPRESSWAY
 0.2 MI. TO INTERSTATE 94
 1360000 FEET
 4624
 4623



United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

SEP 9 1983

IN REPLY REFER TO:

Honorable Harold Washington
Mayor, City of Chicago
121 N. LaSalle Room 507
Chicago, IL 60602

SEP 9 1983

Re: Site of First Sustaining
Nuclear Reactor
Chicago, Cook Co., IL

Dear Mayor Washington:

We are pleased to inform you that the boundary proposed for the above property has been formally established by the National Park Service. The property is listed on the National Register of Historic Places and is eligible for the benefits of listing described in earlier correspondence. We gave careful consideration to the comments we received and in some cases the documentation or boundary has been revised if the National Park Service concurred with the comments. The date of the Keeper of the National Register's signature on the enclosed form is the date the boundary was formally established.

We appreciate your cooperation and interest in the National Historic Landmarks program.

Sincerely,

Carol D. Shull

Carol D. Shull
Chief of Registration
National Register of Historic Places
Interagency Resources Division

Enclosure



United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

JUN 29 1983

Honorable Harold Washington
Mayor-City of Chicago
121 North LaSalle
Room 507
Chicago, IL 60602

Re: Site of First
Sustaining Nuclear
Reactor

Dear Mr. Washington:

The National Park Service has been working to establish boundaries for all National Historic Landmarks for which no specific boundary was identified at the time of designation and therefore are without a clear delineation of the amount of property involved. The benefits now afforded such properties by the National Historic Preservation Act of 1966, as well as the possible application of other statutes, make it essential that we define specific boundaries for each Landmark.

In accordance with the National Historic Landmark program regulations, the National Park Service notifies owners, public officials and other interested parties and provides them with an opportunity to make comments on the proposed boundaries. We are requesting your comments on the proposed boundary for the Landmark stated above and described in the enclosed form.

National Historic Landmark designation has several possible implications, most of which derive from the automatic listing of Landmarks in the National Register of Historic Places. Landmarks are eligible to be considered for Federal grants-in-aid for historic preservation. All Landmarks receive limited protection through comments by the Advisory Council on Historic Preservation on the effect of federally funded, assisted, or licensed undertakings on historic properties.

A Landmark property which is depreciable may be subject to certain provisions of the Tax Reform of 1976, as amended by the Revenue Act of 1978 and the Tax Treatment Extension Act of 1980, and the Economic Recovery Tax Act of 1981. These Acts contain provisions intended to encourage the preservation of depreciable historic structures by allowing favorable tax treatments for rehabilitation, and to discourage destruction of historic buildings by eliminating certain Federal tax provisions for demolition of historic structures. Beginning January 1, 1982, the Economic Recovery Tax Act replaces the rehabilitation tax incentives available under prior law with a 25% investment tax credit for rehabilitations of certain historic commercial, industrial and residential rental buildings. This can be combined with a 15 year cost recovery period for the adjusted basis of the historic building. Historic buildings with certified rehabilitations receive additional tax savings because owners are allowed to reduce the basis of the building by one half the amount of the credit. The Tax Treatment Extension Act of 1980 includes provisions regarding charitable contributions for conservation purposes of partial interests in historically important land areas or structures.

Section 9 of the Mining in National Parks Act of 1976 allows the Secretary of the Interior to request comments from the Advisory Council on Historic Preservation on any surface mining activity that might irreparably damage a National Historic Landmark. If a Landmark contains coal resources, certain provisions of the Surface Mining and Control Act of 1977 make it less likely that surface mining of the coal will be permitted by the State or Federal government.

We will be happy to receive any comments you care to make on the proposed boundaries within 60 days of the date of this letter. Please address your reply to Jerry L. Rogers, Keeper of the National Register of Historic Places, National Park Service, Washington, D.C. 20240, Attention: Chief of Registration.

Because National Historic Landmarks possess significance for all Americans, they are among the most important of the tangible reminders of our country's rich heritage. Designation honors both the Landmarks themselves and the individuals and organizations who have worked to preserve them.

We are pleased to inform you of the status of the pending National Historic Landmark boundary delineation and look forward to your reply. If you have any questions, our staff will be happy to assist you (202-343-9536).

We appreciate your interest in the National Historic Landmark program and your cooperation in this project.

Sincerely,



Carol D. Shull
Chief of Registration
National Register of Historic Places
Interagency Resources Division

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL SURVEY OF HISTORIC SITES AND BUILDINGS

1. STATE Illinois	2. THEME(S). IF ARCHEOLOGICAL SITE, WRITE "ARCH" BEFORE THEME NO XX, Subtheme, Science and Inventions	4. APPROX. ACREAGE
3. NAME(S) OF SITE Site of First Self-Sustaining Nuclear Reaction The World's First Self-Sustaining Chain Reaction Site , Illinois		
5. EXACT LOCATION (County, township, roads, etc. If difficult to find, sketch on Supplementary Sheet) East site of South Ellis Avenue between East 56th and East 57th Streets, Chicago, Cook County		
6. NAME AND ADDRESS OF PRESENT OWNER (Also administrator if different from owner) President George W. Beadle, University of Chicago		

7. IMPORTANCE AND DESCRIPTION (Describe briefly what makes site important and what remains are extant)
Scientists at the University of Chicago achieved the controlled release of nuclear energy for the first time on December 2, 1942. Guided in their efforts by knowledge gained from experiments in nuclear physics throughout the world prior to 1939 and spurred on by Germany's efforts to release the atom, the small group of scientists who first initiated a self-sustaining chain reaction on that fateful day in the 1940s stands at the University of Chicago placed in man's hands the ultimate means of determining his own destiny.

When America undertook the effort to obtain a self-sustaining chain reaction, her overall purpose was to produce an atomic bomb to help secure her own future. By the spring of 1940, scientists at several locations in the country were working on a similar matter. At Columbia University in New York, Dr. Enrico Fermi, a native of Italy, and Dr. Walter H. Zinn, Canadian born, endeavored to design a uranium chain reactor. Others helping them in the project was Dr. Leo Szilard, a Hungarian.

A major problem in designing the reactor concerned the speed of the neutrons in the reaction. Fermi and his associates knew that the bombardment of a uranium atom by neutrons fissioned, or split, the atom, causing the emission of additional neutrons. They also realized that those neutrons fissioned other uranium atoms, which made possible a chain reaction in a sufficiently large mass of uranium. But the neutrons had to be slowed down for a self-sustaining reaction to occur. Fermi finally determined that a good moderator would be pure carbon graphite because it would cause the neutrons to lose energy as they passed through it and be more likely of fissioning the uranium atoms they hit after leaving the carbon. Proceeding on that theory, the Columbia group experimented with a "lattice pile," which measured three feet by three feet by eight feet. This was a pile of graphite bricks, in which, at regular spaces, uranium was placed. Success in using it proved vital for the maturing atomic program.

8. BIBLIOGRAPHICAL REFERENCES (Give best sources; give location of manuscripts and rare works)
Corbin Allardice and Edward R. Trapnell, The First Pile (Argonne, Ill., 1961), 3, 12-15, 17-18; Selig Hecht, Explaining the Atom (New York, 1947), 153, 156, 168-69; Ralph E. Lapp, Roads to Discovery (New York, 1960), 115-17; Henry De Wolf Smyth, Energy for Military Purposes (Princeton, N. J., 1945), 88, 94-96, 98.

9. REPORTS AND STUDIES (Mention best reports and studies, as, NPS study, HABS, etc.)
"An Enrico Fermi Memorial to Commemorate the Achievement of Controlled Nuclear Energy" (Mimeographed news release, University of Chicago, [1964(?)]).

10. PHOTOGRAPHS* ATTACHED: YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	11. CONDITION West Stands destroyed	12. PRESENT USE (Museum, farm, etc.) Tennis courts	13. DATE OF VISIT Nov. 18, 1964
14. NAME OF RECORDER (Signature) S. Sydney Bradford	15. TITLE Staff Historian	16. DATE Dec. 11, 1964	

* COPY MOUNT ON AN 8 X 10 1/2 SHEET OF FAIRLY HEAVY PAPER. IDENTIFY BY VIEW AND NAME OF THE SITE, DATE OF PHOTOGRAPH AND NAME OF PHOTOGRAPHER. IF ATTACHED, ENCLOSE IN PROPER NEGATIVE ENVELOPES.

(IF ADDITIONAL SPACE IS NEEDED USE SUPPLEMENTARY SHEET, 10-317a, AND REFER TO ITEM NUMBER)

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL SURVEY OF HISTORIC SITES AND BUILDINGS
SUPPLEMENTARY SHEET

This sheet is to be used for giving additional information or comments, for more space for any item regular form, and for recording pertinent data from future studies, visitations, etc. Be brief, but use as many Supplement Sheets as necessary. When items are continued they should be listed, if possible, in numerical order of the items. All information given should be headed by the item number, its name, and the word (cont'd).
6. Description and Importance (cont'd) . . .

STATE Illinois	NAME(S) OF SITE Site of First Self-Sustaining Nuclear Reaction The First Self-Sustaining Nuclear Reaction
-------------------	--

7. Importance and Description (cont.)

Early in 1942, the Columbia group moved to the University of Chicago, where it established a so-called "Metallurgical Laboratory" in the West Stands at Stagg Field. While concurrent work progressed elsewhere, Fermi and his colleagues furthered their work concerning the development of the pile. Lack of uranium-oxide and pure graphite prohibited the construction of a large lattice-pile, but while strenuous efforts were made to produce those materials, about thirty experiments with small piles were conducted in Chicago. By July, 1942, those experiments had indicated a design for a pile of critical size, i.e. one in which a self-sustaining chain reaction could be obtained.

A fascinating aspect of the entire undertaking is that a gigantic program had been in motion before a chain reaction had occurred. The scientists had to rely solely on their calculations in all their work. Dr. Zinn in Chicago, for example, had to make the dies for the uranium oxide before they could be tested, and the "entire construction of the pile depended upon the shape and size of the uranium pieces."¹ Those pieces, fortunately, met the requirements for the pile.

The construction of the main pile began in November, 1942. As graphite bricks were machined in the West Stands, Fermi directed the building of the pile in the squash racket court in the same structure. The pile consisted of alternate layers of graphite bricks and pressed uranium oxide, and it grew daily, with all of the scientists realizing that the climax was approaching for their work. A little after 4:00 p.m. on December 1, the last layers of graphite and uranium oxide were put into place. In total, six tons of uranium oxide lay in the pile.

To avoid the possibility of a runaway chain reaction, the builders of the pile had inserted three cadmium rods into it. Cadmium gobbles up neutrons, and if mischance required it, two of the three rods could be pushed into the pile in order to absorb neutrons and halt the reaction. The cadmium rod closest to the bottom of the pile had been calibrated so that it could be gradually pulled out from the pile as the reaction progressed, releasing more and more neutrons as it was withdrawn from the pile.

At 8:30 a.m. on December 2, an expectant group began to assemble in the squash racket court. Standing on a balcony at the north end of the court, Fermi at 9:45, had the electrically controlled set of rods removed. Then, just after 10:00, he directed the withdrawal of "Zip," a manually operated safety rod, be withdrawn. Counters on the balcony for counting neutrons had already begun to operate when, at 10:37, the Italian-born physicist began the withdrawal of the vernier control rod. In successive steps, he pulled it to thirteen feet, and the counters clicked with increasing rapidity. Fermi

¹ Corbin Allardice and E. R. Trapnell, The First Pile (Argonne, Ill., 1951), 8.

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6. Description and Importance (cont'd) . . .

STATE Illinois	NAME(S) OF SITE Site of First Self-Sustaining Nuclear Reaction
-------------------	---

7. Importance and Description (cont.)

had it pulled some additional lengths. Fully confident of success, he then ordered the reaction stopped in order to check everything. And then, just after the experiment had been renewed, the automatic safety rod was activated and halted the reaction. A quick check showed that its safety point had been set too low. Yet, the accident gave Fermi a good chance to halt the experiment in order to eat, which he and his colleagues did.

The group had reassembled by 2:00 p.m. Once again, the vernier control rod was withdrawn at Fermi's direction; and just after having had it withdrawn another six inches, Fermi said

This is going to do it. Now it will become self-sustaining.²

And it did! For the next twenty-eight minutes, the group watched the pile, until the reaction was halted at 3:53 p.m. Someone having brought along a bottle of Chianti, the scientists ended their moment in history by drinking to success out of paper cups.

Subsequently, the official government report on the development of the atomic bomb was officially stated in section 6, paragraph 29,

The pile was first operated as a self-sustaining system on December 2, 1942. So far as we know, this was the first time that human beings ever initiated a self-sustaining nuclear chain reaction.³

Present Condition of the Site

The West Stands were torn down in 1958 because of radiation in the building and the structure's generally unsound condition. A grassy plot between two tennis courts, the site of the squash-rackets court, and on a fence just in front of the site is a marker that commemorates the event.

Because of the significance of the chain reaction, the University of Chicago has agreed to erect a memorial on the site. A building housing the reconstructed pile will be erected, and in it the history of the first self-sustaining reaction will be related.

UNITED STATES
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NATIONAL PARK SERVICE

NATIONAL SURVEY OF HISTORIC SITES AND BUILDINGS
SUPPLEMENTARY SHEET

This sheet is to be used for giving additional information or comments, for more space for any item regular form, and for recording pertinent data from future studies, visitations, etc. Be brief, but use as Supplement Sheets as necessary. When items are continued they should be listed, if possible, in numerical order of the items. All information given should be headed by the item number, its name, and the word (cont'd) . . .

STATE	NAME(S) OF SITE
Illinois	Site of First Self-Sustaining Nuclear Reaction

7. Importance and Description (cont.)

The site is located on South Ellis Avenue, between East 56th and East 57th Street and the proposed memorial building is currently planned for the Midway Plaisance, city blocks south of the Stagg Field site.